

Preliminary Report  
Hurricane Beatriz  
9 - 17 July, 1999

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Beatriz was a typical eastern north Pacific hurricane that was of concern only to ships at sea.

a. Synoptic History

On 26 June, a tropical wave emerged from Africa, accompanied by disorganized deep convection. This system moved fairly rapidly, at 20 knots or more, across the tropical Atlantic. The northern portion of the wave triggered extensive cloudiness and showers over the Bahamas and the waters around southern Florida on the 2nd and 3rd of July. The system moved over Central America and extreme eastern Mexico on the 4th and 5th. By 6 July, cloudiness and deep convection were becoming more consolidated in the vicinity of the Gulf of Tehuantepec. A center of cloud rotation was noted a couple hundred n mi south-southwest of the Gulf of Tehuantepec around 0600 UTC 7 July, but there was insufficient deep convection and curvature for a Dvorak classification at that time. The system remained very disorganized over the following 24 hours or so.

The initial classification, a T1.0 on the Dvorak scale, was done by the Tropical Prediction Center at 1145 UTC 8 July. A gradual increase in organization was noted from visual satellite imagery on the 8th, with increasing curvature in bands of convective clouds surrounding the center of the system. Late on the 8th and early on the 9th, a more rapid increase in organization occurred, and it is estimated that the second tropical depression of the season formed just over 300 n mi south of Lazaro Cardenas, Mexico at about 0600 UTC 9 July (Table 1). Upper-tropospheric outflow appeared to be strong over the area, and steady intensification occurred for about 18 hours after genesis. The cyclone strengthened into Tropical Storm Beatriz by 1200 UTC on the 9th. Maximum winds increased to near 45 knots by 0000 UTC 10 July, however, for unknown reasons, the intensification ceased for the next 12 to 18 hours. Then, Beatriz started to strengthen again, and it is estimated that it became a hurricane around 1200 UTC 11 July, while centered about 560 n mi south-southwest of Cabo San Lucas.

With a mid-tropospheric ridge in place to the north, Beatriz moved westward or just slightly north of westward, i.e., on about the climatological heading, during its strengthening from depression to hurricane. Beatriz continued to strengthen, as a well-defined eye appeared in satellite imagery around 0000 UTC 12 July. Early on the 12th, microwave imagery data showed evidence that Beatriz had concentric eyewalls, and the hurricane was probably undergoing an eyewall replacement. By 1700 UTC, the microwave data suggested a single, 20-25 n mi thick, closed eyewall. It is estimated that the hurricane reached its peak intensity, 105 knots, around 0600 UTC 13 July, with a clear-cut 20 n mi diameter eye centered about 800 n mi southwest of Cabo San Lucas. In response to a slight weakness in the subtropical ridge, Beatriz turned to a west-northwestward direction and began a gradual weakening trend after 1200 UTC on the 13th. With the hurricane passing over only slightly cooler waters, the weakening was quite slow for 48 hours; maximum winds were down to about 80 knots by 1200 UTC 15 July. Thereafter, the decline was more rapid, with Beatriz weakening to a tropical storm by 0000 UTC on the 16th, and to a depression by 1800 UTC that same day. After being reduced to a swirl of mostly low clouds, the cyclone turned to a more westward heading, and dissipated by 0600 17 July in the general vicinity of 20°N 135°W.

#### b. Meteorological Statistics

Figure 1 is a plot of the “best track” positions for Beatriz. Figures 2 and 3 are curves of the best track maximum sustained (1 min average) surface (elevation of 10 m) wind speed and minimum central pressure, respectively, as well as the observations on which these curves are based. Satellite imagery was used to locate the center of Beatriz throughout its existence, and the best track winds and pressures were based on Dvorak-technique estimates provided by the Tropical Analysis and Forecast Branch (TAFB), the NOAA/NESDIS Satellite Analysis Branch (SAB), and the Air Force Weather Agency (AFGWC in the figures).

Although the maximum winds of the hurricane were estimated to be close to 105 knots from 0000 UTC to 1200 UTC 13 July, 3-hourly averaged objective Dvorak T-numbers suggest that the minimum central pressure of Beatriz occurred closest to 0600 UTC 13 July.

A ship with call sign VRUM4 reported tropical storm force winds (030°/35 knots) about 190 n mi north-northeast of the center of Hurricane Beatriz at 1200 UTC 13 July.

### c. Casualty and Damage Statistics

Not surprisingly, since Beatriz remained at sea, there were no reports of casualties or damage.

### d. Forecast and Warning Critique

Table 2 summarizes the track forecast errors for Beatriz. It can be seen that the mean official track forecast errors were substantially lower than the long-term averages. Among the various track prediction models, only the UKMI had a lower average error than the official forecast.

There were some large intensity under-predictions, around 35 knots in the 48- and 72-hour official forecasts, on 10 and 11 July. Otherwise, the official intensity forecast errors were 10 to 15 knots or less. The GFDL model did a particularly poor job in the 48- to 72-hour intensity forecasts from 10-11 July, with the model showing Beatriz to be practically dissipated at about the time of its (actual) maximum strength.

No watches or warnings were issued for Beatriz.

Table 1. Best track, Hurricane Beatriz, 9-17 July, 1999

Date/Time (UTC)	Position		Pressure (mb)	Wind Speed (kt)	Stage
	Lat. (°N)	Lon. (°W)			
9/0600	12.9	103.0	1008	30	tropical depression
1200	13.1	103.9	1005	35	tropical storm
1800	13.4	105.2	1002	40	“
10/0000	13.8	106.7	1000	45	“
0600	14.1	108.0	1000	45	“
1200	14.3	109.1	1000	45	“
1800	14.4	110.2	997	50	“
11/0000	14.4	111.5	994	55	“
0600	14.4	112.9	990	60	“
1200	14.3	114.2	985	65	hurricane
1800	14.1	115.2	980	75	“
12/0000	14.0	116.3	975	85	“
0600	14.0	117.4	970	90	“
1200	14.1	118.3	970	90	“
1800	14.2	119.3	960	100	“
13/0000	14.5	120.3	956	105	“
0600	14.7	121.3	955	105	“
1200	15.1	122.2	956	105	“
1800	15.4	123.0	960	100	“
14/0000	16.0	124.0	961	100	“
0600	16.4	124.9	965	95	“
1200	17.0	125.7	967	95	“
1800	17.5	126.5	970	90	“
15/0000	17.9	127.2	975	85	“
0600	18.4	128.0	978	80	“
1200	18.7	128.8	980	75	“
1800	19.0	129.4	987	65	“
16/0000	19.3	130.4	992	60	tropical storm
0600	19.6	131.5	995	55	“
1200	19.7	132.2	1000	45	“
1800	19.7	132.7	1004	30	tropical depression
17/0000	19.8	133.8	1007	25	“
0600					dissipated
13/0600	14.7	121.3	955	105	minimum pressure

Table 2.

**Preliminary track forecast evaluation of Hurricane Beatriz  
Heterogeneous sample**

(Errors in nautical miles for tropical storm  
and hurricane stages with number  
of forecasts in parenthesis)

Technique	Period (hours)				
	12	24	36	48	72
CLIP	27 (27)	51 (25)	80 (23)	113 (21)	165 (17)
GFDI	39 (27)	77 (25)	113 (23)	123 (20)	134 (16)
GFDL*	27 (26)	65 (24)	103 (22)	127 (20)	138 (16)
LBAR	27 (27)	67 (25)	118 (23)	177 (21)	299 (17)
AVNI	37 (24)	90 (24)	173 (19)	275 (10)	427 (5)
BAMD	26 (27)	51 (25)	85 (23)	129 (21)	209 (17)
BAMM	33 (27)	71 (25)	128 (23)	200 (21)	338 (17)
BAMS	34 (27)	70 (25)	127 (23)	203 (21)	335 (17)
P91E	27 (27)	50 (25)	75 (23)	106 (21)	170 (17)
NGPI	41 (22)	78 (21)	96 (19)	113 (18)	170 (15)
UKMI	19 (25)	33 (23)	49 (21)	68 (19)	102 (15)
NHC OFFICIAL	26 (27)	50 (25)	72 (23)	99 (21)	111 (17)
NHC OFFICIAL 1988-1997 10-year average	39 (2527)	71 (2266)	105 (1998)	137 (1755)	195 (1337)

\* GFDL output not available until after forecast issued.

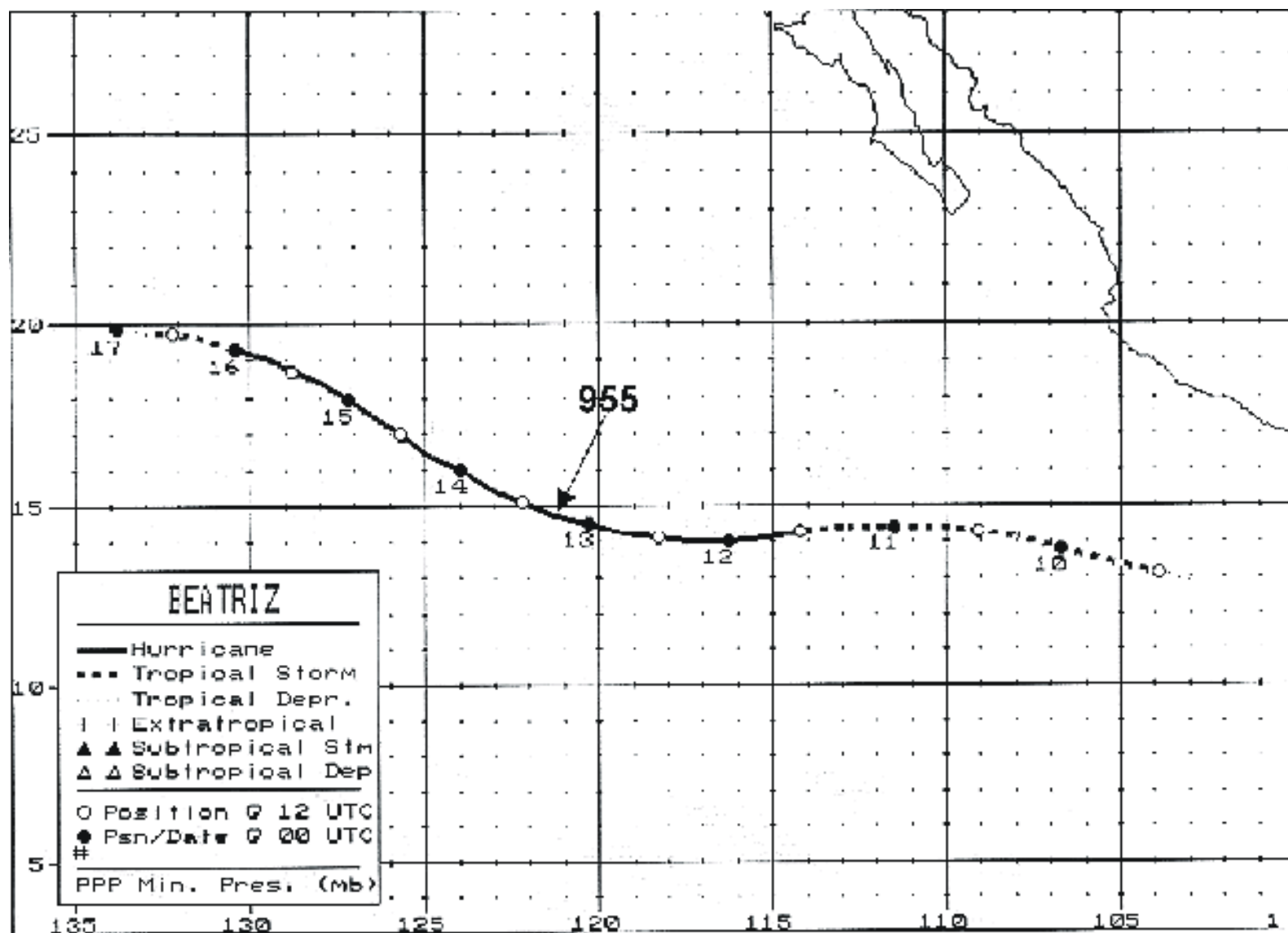


Figure 1. Best track positions for Hurricane Beatriz, 9-17 July, 1999.



